Overview

- AXMEDIS aims and complexity
- AXMEDIS model and tools
- AXMEDIS DRM
- Automated back office tools
- Distribution Scenarios
- Exploitation Activities
**Project Goals**

- Costs Reduction for content production and distribution for multichannel
- Better integration along the value chain
- Interoperability among channels/devices taking into account DRM and formats
- Large range of different scenarios:
  - From VOD to DVB
  - From mobile to TV
  - From B2B to B2C
  - trials, take ups actions, ..
- Along the social network growing, UGC, UGE

**Partners**
Major points of complexity

- Modeling a flexible framework with
  - Different content formats/models
  - Different distribution formats/models
  - Different devices, platforms, players,..
  - Different distribution protocols: streaming, download, progressive download, multipath streaming DIS, P2P, progressive P2P, …
  - Different business and transactions models
  - Different standards along the several aspects
  - Different life cycles and best practices for back office
  - Etc.
Points of Complexity

- **Content formats vs players**
  - high production costs for authoring tools and players
  - Lack of intelligence on players
  - Custom vs standard, limited vs interoperable
  - Large variety of platforms, mobile foot print

- **Protection, DRM along the value chain, B2B2C**
  - Number of licenses processed for objects: $O(MN)$
  - Millions of users are licensed for millions of objects !!
  - Managing life cycle rights and business models/transactions

- **Automated content production**
  - Production on demand, real time processing on user needs
  - Dynamic and static profiling
  - Dynamic content adaptation and formatting (layouting)
  - Processing profiles and descriptors in real time
  - Management of UGC and professional content

- **Multichannel production vs distribution**
  - Flexibility in refactoring/scaling up the back office
  - Processing in real time, managing multichannel back office
  - Huge costs of integration, business models, trans. Models…
AXMEDIS Technical Architecture

User Interaction and/or Automated Control via WSs

Overview

- AXMEDIS aims and complexity
  - Lack of intelligence on players
  - Custom vs standard, limited vs interoperable
  - Large variety of platforms, mobile footprint
  - High complexity of authoring tools and player
  - High production costs

- AXMEDIS DRM

- Automated back office tools

- Distribution Scenarios

- Exploitation Activities
Interactive and intelligent

- integrated media info
- proactive with the users
- attractive experience
- personalized
- multichannel interoperable
- device interoperable

Examples: Intelligent Content

- Single Files:
  - audio, video, document, images, etc.
- Interactive Content:
  - HTML or SMIL as technology of User interaction
  - Guides, games, etc.
  - Valoriz. of Cultural Heritage content
  - Educational Content
- Proactive Wizard:
  - Video messg. Recording, UGC
  - Assisted upload
  - Production of licenses
  - User profile processing
  - Taking decision
  - Local indexing/searching
  - Local assistant
  - ...
AXMEDIS Object/Package Model

**AxObject**

**AxMetadata**

- **AxOID**
- **AxInfo**
- **AxDublinCore**

**AxContent**

**AxMethods**

- **AxResource**
- **AxReferredObject**

**MPEG21 Digital Item**

- Unique identification
- Mandatory
- Content description
- Special B2B metadata
- Unique identification
- Resource embedding
- Hierarchical composition
- Externally content referencing
- Intelligent, logic & behaviour

An example to wrap it all up

**Music Album**

- **AxInfo**
  - Rights Owner
  - Producer
  - Distributor

- **DublinCore**
  - Title
  - Genre
  - Authors

- **Other Descriptions (e.g. MPEG7)**

**Backstage Video**

- **Rights Owner**
- **Producer**
- **Distributor**

- **Video**
  - Genre
  - Authors

- **Subtitles**
  - Languages
  - Playing time
  - Resolution

- **Resource MPEG2 Video**

- Metadata will always be accessible for indexing and querying
**AXMEDIS Cross Media Content**

- Any content inside a package:
  - Mix of: HTML, SMIL, MPEG-4, video, audio, text, Documents, images, actions, games, animations, etc.
  - Additional content and interactivity for the end users
  - compliant and extending MPEG-21

- **AXMEDIS Intelligent content** allow user/producers to
  - create content for other devices: ringtones, mobiles, ...
  - support social activity
    - annotations
    - user generated content
    - personal collections
  - internal query
  - customized for culture and language

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**Interoperable Players**

- Various players shown, each with different content and user interfaces.
Overview

- AXMEDIS aims and complexity
- AXMEDIS model and tools
- AXMEDIS DRM
  - Standards de facto, lack of acceptance, …
  - Millions of users are licensed for millions of objects!!
  - Number of licenses processed for objects: \(O(MN)\)
  - Managing life cycle rights and business models/transactions
  - Lack of agreements about the meaning of rights and ontology

- Automated back office tools
- Distribution Scenarios
- Exploitation Activities

<table>
<thead>
<tr>
<th>market solutions</th>
<th>via</th>
<th>AXMEDIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Models</td>
<td></td>
<td>Larger number of Business Models</td>
</tr>
<tr>
<td>Proprietary / Standard DRM and model</td>
<td></td>
<td>Standard DRM: MPEG-21, OMA, etc.</td>
</tr>
<tr>
<td>Non Interoperable DRM</td>
<td></td>
<td>Allowed Interoperable DRM: MPEG-21, OMA, etc.</td>
</tr>
<tr>
<td>Fixed/Flexible Protection Model</td>
<td></td>
<td>Any Protection Model, key, algorithms, etc.</td>
</tr>
<tr>
<td>Separation among Content and license</td>
<td></td>
<td>Separation among Content and license</td>
</tr>
<tr>
<td>Signed Content Header</td>
<td></td>
<td>Signed Content AXINFO, any Metadata</td>
</tr>
<tr>
<td>Channel distribution</td>
<td></td>
<td>Multichannel with the same license</td>
</tr>
<tr>
<td>Players and Devices</td>
<td></td>
<td>Players and Devices: PC MS-Windows, PDA Windows Mobile, STB, Linux OS, Apple MAC (in progress), Java Mobiles</td>
</tr>
<tr>
<td>License Proprietary: number of rights, domains</td>
<td></td>
<td>Licenses MPEG-21 REL: Expandable dictionary, any type of rights, licenses OMA, domains</td>
</tr>
<tr>
<td>Authentication of Player</td>
<td></td>
<td>Authentication of device, user, domain, etc.</td>
</tr>
<tr>
<td>Revocation per Player</td>
<td></td>
<td>Revocation per device, user, etc.</td>
</tr>
<tr>
<td>Revocation per license</td>
<td></td>
<td>Revocation per license</td>
</tr>
<tr>
<td>Source code non accessible</td>
<td></td>
<td>Source Code Accessible</td>
</tr>
<tr>
<td>Limited Metadata</td>
<td></td>
<td>Any metadata, custom metadata, any ID, any Descriptor</td>
</tr>
<tr>
<td>Media content, simple content, not intelligent</td>
<td></td>
<td>Any digital format, of any type: audio, video, image, games, doc, and Cross media: SMIL, HTML, MPEG-4,… INTELLIGENT content</td>
</tr>
<tr>
<td>Customizable Tools</td>
<td></td>
<td>Customizable Tools: servers and player clients</td>
</tr>
</tbody>
</table>
Managing License Chain, B2B and B2C

- **Alice** states, “Bob has the right to issue a license to anyone to print the book in Italy”
- **Bob** states, “Carl has the right to print the book in Italy”
- To solve the SubSubLicense for Carl all the connected Licenses are needed
- Licenses have to be accessible on Processing Engine
- Alice can revoke the license to Bob

Cross media content and composition

- AXMEDIS objects can be used as components for creating other added values AXMEDIS objects
  - Allowing the production added value object for composition or integration of protected content
    - Who is composing can add its own prot. and licensing
  - Allowing the Rights Management of Composition, in the digital world similarly at what is performed in the physical world
  - The shares along the value chain are de facto formalized
Managing License Chain and Protection Information

Protection Manager Support
License Server, DRM Processor

Certifier and Supervisor

Protection Info
Action log database

Store Key

Produce License

Content provider

Content Integrator

Content Distributor

Digital Protected Content

Content provider

Protection Manager

License Server, DRM Processor

Right Auth.

Digital Protected

License

Produce License

Auth to integrate

Produce License

Auth to distribute

Produce License

Produce License

Produce License

DRM and Domain Management

- Users are strongly interested in acquiring a content to be used in their domain in which they have their
  - Home devices, cars, mobiles, etc.
- Media Centers and/or Home Servers are going to manage content and licenses for the whole domain
  - One license for all devices and people
Overview

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- AXMEDIS DRM

**Automated back office tools**
- Flexibility and scalability of back office, thousands of features, complex media processing language, programming grid
- Processing profiles and descriptors in real time
- Production on demand, real time processing on user needs
- Management of UGC and professional content
- Dynamic and static profiling
- Dynamic content adaptation and formatting (layouting)

- Distribution Scenarios
- Exploitation Activities

Enabling massive content production and processing

- AXMEDIS GRID language and tools for
  - Automated Content Ingestion and Gathering
  - Automated Content Query and Retrieval
  - Automated Content Load and Storage: databases and files
  - Automated Content and Metadata Processing, enrichment
  - Automated Content and Data processing
  - Automated Content Filtering and Repurposing
  - Automated Content Composition, Formatting
  - Automated Content Protection and Licensing
  - Automated Content Publication/Download on/from any channel
  - Automated Content Distribution via Multichannel
  - Automated Profiles management and processing
  - Automated Production of Content on Demand
  - Automated semantic processing, recc, taking decisions, etc.
AXMEDIS Content Processing GRID

Front end servers, VOD, prod on demand

Workflow manager

AXMEDIS Rule Editor

AXCP Visual Designer

AXCP nodes

AXMEDIS Workflow manager

Quick Starter

AXCP Scheduler

AXCP Grid Rules

Visual Elements and Rules

Plug-in for content processing

WS, FTP, etc.

Your CMSs

AXMEDIS Database

Distribution Channels and servers

Some Snapshots from the examples shown
AXMEDIS slides, http://www.axmedis.org

AXMEDIS

AXCP Visual Designer

Rule Editor

Users

Add info

 AXMEDIS Rule Editor

Few Ready to use rules

Scheduler

Activate Rule

Content Databases

AXCP GRID

Content: Search, Selection, Acquisition, Production, Adaptation, Transcoding, Formatting, Packaging, Protection, Publication and Licensing on Demand

APPLICATIONS: balancing, UGC, repurposing, publication, recommendations, integration with SN, redistribution, crawling

Distributor front end server

Users

Activate Rule

Content: Search, Selection, Acquisition, Production, Adaptation, Transcoding, Formatting, Packaging, Protection, Publication and Licensing on Demand

APPLICATIONS: balancing, UGC, repurposing, publication, recommendations, integration with SN, redistribution, crawling

AXMEDIS DRM

YouTube, ...

P2P, ….
Examples of Cross media Adapation

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- Automated back office tools
  - Distribution Scenarios
    - Large range of possible applications: 3-play, 4-play, Multichannel, CH applications, mobile, etc.
    - Flexibility in refactoring/scaling up the back office
    - Processing in real time, managing multichannel back office
    - Huge costs of integration, business models, transaction Models...
- Exploitation Activities
Multichannel Distribution

- **VOD, Video or Content on Demand:**
  - Internet P2P, PC, mobile, IPTV streaming: STB Motorola
  - Streaming of AXMEDIS MPEG-21, audio/video
  - Progressive download of AXMEDIS MPEG-21, audio/video

- **Satellite data broadcast**
  - Distribution in Push, STB/PVR

- **DVB-T**
  - EPG + recording + intelligent content
  - HD protection in stream

- **PDA and Kiosks**
  - Push on Kiosks, Download on PDA

- **Mobiles**
  - Interoperable MPEG-21 and OMA DRM production
  - AXMEDIS/MPEG-21 player for mobiles
  - Download and progressive download on mobiles, java

- **UGC, user generated or posted content**
  - Automated production, transcoding, licensing, etc.
  - Multichannel support for social network
  - XMF, social network, ..

- **P2P as support for the above channels**
  - B2B and/or B2C networks

AXMEDIS P2P network architecture
Cross media Content, from video, audio to complex content

Controlled P2P network

Push Distribution and AXMEDIS Technology

AXMEDIS
Content Processing

AXMEDIS DRM
Content Production on the Consumer Side

Cross media Content, from video, audio to complex content

Added value content via ADSL

Free on air transmission

Recording, added value Content
Package on site production and domain management

TV free on air

BBC Broadcasting DVB-T

Accounting and reporting

AXMEDIS DRM

Examples Content from AX4HOME

AXMEDIS slides, http://www.axmedis.org
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  - Exploitation Activities
    - DRM B2C solution for complex content
    - Intelligent proactive content with DRM
    - Cultural heritage content repurposing and distribution
    - Social networking
    - Smart mobile social enabled content, personal recommendations

Content Enrichment

- [http://www.variazioniproject.org](http://www.variazioniproject.org)
- Content Enrichment
  - produced and reproduced on demand
  - production with DRM
  - AXMEDIS web player
Access to Open Archive resources

In collaboration with FRD, Italy

AXMEDIS DRM with

- AXMEDIS
  - Hiding complexity

- AXMEDIS AXCP
  - protection packager

- AXMEDIS
  - Active X Player

- AXMEDIS DRM
  - registration
  - License servers
  - AXCS
Distribution of cultural content, AV guides

- At MUSA: instrument museum at Accademia Nazionale di Santa Cecilia, Roma
- Usable for AV guides, even with RFID
- Production of content for continuous formation, in medical area or for other interactive guides
- Monitoring of the user activities

DC Store, DC Channel

- Distribution of large objects ISO of CD, DVD, etc. as protected intelligent content
- Distribution via P2P, protection via AXDRM
- The intelligent content played into the AXMEDIS player helps the user to make registration, certification …
- The Intelligent content extract the ISO on the disk
Recommendations: UU, OU, OO, ..

Potential friends

<table>
<thead>
<tr>
<th>Name</th>
<th>Distance</th>
<th>Add to friends</th>
</tr>
</thead>
<tbody>
<tr>
<td>phistestasia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECUADOR, Orientalia</td>
<td></td>
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<tr>
<td>ahala</td>
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<td></td>
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<tr>
<td>MALDIVES, Riaa</td>
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</tr>
</tbody>
</table>

Personal Mobile Social Intelligence

AxObjectFinder
- HTML & CSS Based Presentation Engine
- Download/Uploaded images
- File Explorer
- Local Browser
- Search Engine
- Taxonomy Browser
- User Behavior Collection
- Contextual Information

AxPDAPlayer
- Media Player
- PDF Player
- Player

SQLite DB
- Local PDA files

Content Indexer, semantic ingestion/processing
- Thanks!

- Tools can be downloaded from web sites and on shareware sites

- [http://www.axmedis.org](http://www.axmedis.org)
  - Tools, docs, etc.

- [http://mobmed.axmedis.org](http://mobmed.axmedis.org)
  - Mobile Medicine Social network

- [http://xmf.axmedis.org](http://xmf.axmedis.org)
  - ....

- ....